Claims

1. A Viterbi decoder including an Add-Compare-Select unit having a
    butterfly unit (300) comprising:

5   first adder means (310) for receiving a first path metric and a
    branch metric and for producing at its output the addition
    thereof;

    second adder means (320) for receiving a second path metric
    and said branch metric and for producing at its output the

10   addition thereof;

    first comparator means (330) coupled to receive the output of
    the second adder means and coupled to receive the first path
    metric for comparing therebetween;

    second comparator means (340) coupled to receive the output of

15   the first adder means and coupled to receive the first path
    metric for comparing therebetween;

    first selection means (350) for selecting between the second
    adder means output and the first path metric to produce a first
    survivor path metric in dependence on the first comparator

20   means comparison; and

    second selection means (360) for selecting between the first
    adder means output and the second path metric signal to
    produce a second survivor path metric in dependence on the
    second comparator means comparison,

25   for processing metric transitions where a second branch metric is zero.

2. The Viterbi decoder of claim 1 wherein the Add-Compare-Select unit further comprises a butterfly unit (300) having:

> first, second, third and fourth adder means for receiving a first metric, a second metric, a first branch metric and a second branch metric;

> first comparison means for comparing outputs of the first and second adder means;

> second comparison means for comparing outputs of the third and fourth adder means;

> first selection means for selecting between the outputs of the first and second adder means in dependence on the comparison of the first comparison means to produce a first survivor path metric; and

> second selection means for selecting between the outputs of the third and fourth adder means in dependence on the comparison of the first comparison means to produce a second survivor path metric.

3. The Viterbi decoder of claim 1 adapted for code rates of the type $R = k/m$, where $k>1$, and k and m are integers.

4. A method of producing metrics for use in a Viterbi decoder comprising selecting metrics such that for at least some trellis transitions a branch metric is zero, whereby a simplified Add-Compare-Select butterfly unit may be used.

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5. The method of claim 4 wherein the metrics are selected by subtracting from each of a predetermined set of metrics a chosen one thereof to produce a resultant set of metrics having at least one zero value.

10 6. The method of claim 4 further comprising re-adjusting the dynamic range of the selected metrics by multiplying each of the selected metrics by a scaling factor if the following property is satisfied:

$$m_a(bit = 0) = -m_a(bit = 1) \forall a$$

15 7. The method of claim 6 adapted for OFDM coding.

8. The method of claim 6 further comprising adapting the selected metrics to additive noise.

20 9. The method of claim 7 wherein the additive noise comprises coloured noise.

10. The method of claim 4 adapted for code rates of the type $R = k/m$, where $k>1$, and k and m are integers.

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11.   A butterfly unit for use in a Viterbi decoder Add-Compare-Select unit, the butterfly unit (300) comprising:

first adder means (310) for receiving a first path metric and a branch metric and for producing at its output the addition thereof;

second adder means (320) for receiving a second path metric and said branch metric and for producing at its output the addition thereof;

first comparator means (330) coupled to receive the output of the second adder means and coupled to receive the first path metric for comparing therebetween;

second comparator means (340) coupled to receive the output of the first adder means and coupled to receive the first path metric for comparing therebetween;

first selection means (350) for selecting between the second adder means output and the first path metric to produce a first survivor path metric in dependence on the first comparator means comparison; and

second selection means (360) for selecting between the first adder means output and the second path metric signal to produce a second survivor path metric in dependence on the second comparator means comparison.

12.   The butterfly unit of claim 11 adapted for code rates of the type $R = k/m$, where $k>1$, and k and m are integers.